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I, LEANNE MYNOTT, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PQ 2071 for a patent by THE UNIVERSITY OF MELBOURNE filed on 06 August 1999.



WITNESS my hand this
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LEANNE MYNOTT
TEAM LEADER EXAMINATION
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PROVISIONAL SPECIFICATION

FOR THE INVENTION ENTITLED:

"IMPROVED COCHLEAR IMPLANT RECEIVER-STIMULATOR PACKAGE"

Applicant:

THE UNIVERSITY OF MELBOURNE

IMPROVED COCHLEAR IMPLANT RECEIVER-STIMULATOR PACKAGE

Field of the Invention

This invention relates to improvements in cochlear implants, and more particularly to improvements relating to receiver-stimulator package shapes to enable
5 the cochlear implant to be positioned in a patient in a more appropriate location than the location presently used.

Background of the Invention

Present cochlear implant receiver-stimulators are placed in a patient by drilling a bed into and through the mastoid bone lying behind the ear. The bed is usually
10 made by drilling the bone down to the lining of the brain or dura mater. The receiver-stimulator of the cochlear implant made by Nucleus has a receiver-stimulator package for the stimulation electronics made from titanium which is fitted into the bed in the mastoid bone. A receiver coil extends from the back end of the package and lies superficial to the bone. Other cochlear implants have included packages made from
15 ceramic material and these are usually placed completely within a bed drilled down to the lining of the brain, especially in young children.

In young children, placing either of the above packages in the mastoid bone some distance behind the ear can lead to the packages creating an external swelling, which can be unsightly. More importantly, such placements of the package can lead
20 to serious damage caused by blows to the head. Blows to the head can lead to fractures of the electrode where it exits the package, or cracking of the ceramic package. In addition, because the packages are placed in this particular location especially where a bed is drilled down to the lining of the brain, a blow can cause the package to enter the cranial cavity and damage structures including the brain.

25 Summary of Invention and Object

It is an object of the present invention to provide an improved receiver-stimulator package for a cochlear implant shaped to be received in a more appropriate location within the skull of the patient.

The invention provides a receiver-stimulator package for a cochlear implant,
30 said receiver-stimulator including stimulator electronics contained within a protective

housing and connected by leads to an electrode array adapted for insertion into the cochlea of a patient, and by further leads to a receiving and/or transmitting coil enclosed within a protective casing, said protective housing being dimensioned and shaped to be capable of location within the mastoid cavity of the patient nearer to the
5 entry point of the electrode array to the cochlea, said further leads being contained in flexible arms connecting the protective housing and the protective casing.

By positioning the receiver-stimulator electronics housing in this way, the housing is less exposed to the risk of trauma caused by blows to the head as it lies below the surface of the skull bone and is therefore less susceptible to a direct blow,
10 and is additionally protected by the overlying pinna. The flexible arms enable the coil to be placed in the optimal position and, depending on the anatomy and the age of the person, over time the arms would adjust to any changes in head shape.

Brief Description of the Drawing

A preferred embodiment of the invention will now be described with reference
15 to the accompanying drawing which schematically illustrates the embodiment.

Description of Preferred Embodiment

Anatomical dissections show that there is a gutter lying between the sigmoid sinus, posterior osseous ear canal, the mastoid tip and the floor of middle fossa where an appropriately shaped housing for the receiver-stimulator can be placed so that the
20 housing is not exposed above the surface of the bone.

As illustrated in the drawing, the housing comprises a narrow elongate rectangular housing having rounded ends, somewhat like a flattened ovoid or lozenge shape, which is received in the mastoid cavity referred to above. The housing may be made from titanium, similar to the Nucleus device, or from cast or moulded ceramic
25 material.

As described above, the protective housing for the receiver-stimulator electronics is connected by suitable leads to a transmitter/receiver coil, the leads being contained within flexible arms of inert material such as silicone rubber.

The coil is enclosed within a protective casing, which is received in a drilled
30 bed in the mastoid bone behind the ear. Suitably shaped beds connecting the mastoid

cavity and the drilled bed receive the flexible arms containing the connecting leads.

Since the receiver-stimulator housing is located in the mastoid cavity, below the surface of the bone, it is less susceptible to damage and is protected and hidden by the overlying pinna. The flexible arms allow optional positioning of the coil and
5 permit changes in head shape.

The receiver-stimulator electronics, the transmitter/receiver coil, and the electrode array for implantation in the cochlea of the patient are configured in accordance with the patent literature relating to the cochlear implant technology and do not form any part of the present invention.

10 While one preferred shape for the protective housing has been described above, it will be appreciated that different shapes, which are capable of lying wholly within the gutter forming part of the mastoid cavity, can be adopted without departing from the essence of the invention defined above.

It will also be appreciated that various modifications and alterations may be
15 made to the system described above without departing from the scope and spirit of the invention.

DATED: 6 August 1999

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